

## 7. REPORT ON THE TERRESTRIAL AND FLUVIATILE MOLLUSCA OF PALESTINE. BY H. B. TRISTRAM, CORR. MEMB.

The character of the Molluscan fauna of Palestine partakes, as might have been expected, of the same variety which marks the other branches of its fauna and flora. There are, however, fewer exceptions to its general character as a part of the Mediterranean basin, and fewer traces of the admixture of African and Indian forms. Northern types, especially of the genus *Clausilia*, are frequent in the Lebanon and on its southern spurs in Galilee. The Molluscan fauna of the maritime plains and the coast possesses no features distinct from those of Lower Egypt and Asia Minor. The shells of the central region are scarce and not generally interesting; while on the borders of the Jordan valley and in the southern wilderness we meet with very distinct groups of *Helix* and of *Bulinus*, chiefly of species peculiar, or common in some few cases to the Arabian desert.

The fluviatile Mollusca are of a type very much more tropical in its character than that of the terrestrial shells. There are here but few species similar to those of the east of Europe. Most of the species are identical with, or similar to, those of the Nile and of the Euphrates; and some of the genus *Melanopsis* are peculiar to the Jordan or its feeders. It seems probable that the inhabitants of the waters were better able to sustain the cold of the glacial epoch than the mollusks of the land; and from the post-tertiary remains found by the Dead Sea we may infer that the species now existing have been transmitted from a period antecedent to the glacial; while the more boreal forms introduced at that epoch have maintained their existence in the colder districts of Northern Palestine to the exclusion of the southern species, which have not succeeded in re-establishing themselves. The beautiful group *Achatina*, requiring a degree of moisture not generally found in Palestine, is only represented by a few insignificant and almost microscopic species.

The Molluscan fauna of this country has been less neglected than other branches of its natural history. Olivier first published a few species through Férussac in 1821. Ehrenberg added many more, of which eighteen were described as new. Boissier published his list in the 'Zeitschrift für Malakologie' in 1847. Bourguinat published and figured in 1853 the collection made by M. de Saulcy; and Dr. Roth, in his 'Molluscorum Species,' in his 'Spicilegium Molluscorum,' 1855, and 'Coquilles Terrestres et Fluviatiles,' edited by A. Mousson, 1861, has supplied us with a catalogue far more complete and exhaustive than any of his predecessors.

It will be seen that while we have not, as the result of our expedition last year, to report many entirely new species, we succeeded in obtaining very many which had not occurred to Dr. Roth, and several which had escaped the observation of all our predecessors.

As it seems probable that several species have been redescribed by authors who were not acquainted with the works of previous writers, I have thought it advisable to confine my report to the Zoological

Society to such species as were collected by ourselves, simply appending a list of reputed species not found by us.

1. *LIMAX PHENICIACUS*, Bourg.

Very common in the maritime plains from Beyrout to Jaffa, and in the valleys which abut on them. Not observed in the interior. Easily distinguished from *L. agrestis* by its larger size and its crowded black spots. It is very slightly wrinkled, and reaches a length of upwards of 2 inches.

2. *LIMAX BERYTENSIS*, Bourg.

In the same localities as the preceding, but by no means so plentiful. It is of much smaller dimensions, and may be at once distinguished by its deep black colour, and its mantle placed not in front, but almost on the centre of its back.

3. *LIMAX TENELLUS*, Müll.

I found several specimens of a slug in moist valleys south of the Lebanon, which I can in no way distinguish from the European species.

4. *TESTACELLA SAULCYI*, Bourg.

I dug up four fine specimens of this interesting species in the Wady Kurn, near the plain of Acre.

5. *SUCCINEA PFEIFFERI*, Rossm.

Among reeds near Beyrout.

6. *SUCCINEA GLOBOSA*, n. sp.

*T. ovato-globosa, fragilis, tenuis, nitida, delicatissime striata, aurantiaco-rubra; spira acuta, vix elongata; anfrac. 3½, convexi, ultimus subito accrescens, inflatus, basi expansa; apertura rotundo-ovalis, superne rotundata; peristoma simplex, margine columellari superne reflexiusculo.*

Long. 14, diam. 10, alt.  $8\frac{1}{2}$  mill.

This beautiful and most peculiar species was obtained by me on papyrus-stems in the marshes of Huleh (waters of Merom), in the Upper Jordan. In the rotundity of its form and the diaphanous redness of its coloration it is widely removed from any other of the group which I have seen. The animal is very large for the shell.

7. *HELIX SANCTA*, Bourg.

Near Jerusalem. Mousson considers this only a giant variety of *H. cellaria*. The differences, however, appear constant, both in colour and convexity.

8. *HELIX NITELLINA*, Bourg.

Scarce throughout the country.

9. *HELIX CELLARIA*, Müll.

In the north only.

10. *HELIX JEBUSITICA*, Roth.

Near Jerusalem, Sarepta, and Nazareth. Easily distinguishable from *H. sancta* by its less regular and less delicate striation, and by its much larger umbilicus—and from the following species by its rounded umbilicus and the less rapid increase of its whorls.

11. *HELIX ÆQUATA*, Mouss.

Only in the north, near the coast.

12. *HELIX CAMELINA*, Bourg.

Near Nazareth, Jericho, and Jerusalem.

13. *HELIX HIEROSOLYMITANA*, Bourg.

Not uncommon close to Jerusalem; not met with elsewhere.

14. *HELIX PULCHELLA*, Müll.

We found a single specimen of this worldwide species under a stone in the plain of Acre.

15. *HELIX CONSPURCATA*, Drap.

On the coast near Sidon.

16. *HELIX ERDELII*, Roth. (= *H. flavida*, Rossm.?)

Near Jerusalem.

17. *HELIX SYRIACA*, Ehrenb.

One of the most abundant shells in every part of the country.

18. *HELIX OLIVIERI*, Fér.

Very common everywhere.

19. *HELIX CARMELITA*, n. sp.

*T. imperforata, depressa, flavida, vix pellucida, nitida, regulariter et pulcherrime striata; anfract. 6, convexi, lente accrescentes, sutura profunda, ultimus ad aperturam deflexus; apertura compressa, obliqua, lunaris; perist. reflexo, flavido, intus albescente, densato; basi rotundata.*

Diam. maj. 8, min. 7, alt. 4 mill.

Two adult and several young specimens of this very distinct and pretty little shell were collected by us on Mount Carmel. It seems to bear no affinity to any other species in the country; but is somewhat like *H. partita*, Pfr., from Ceylon, which, however, is umbilicated.

20. *HELIX BERYTENSIS*, Fér.

Generally distributed in small numbers through the country.

21. *HELIX LENTICULA*, Fér.

Near the coast.

22. *HELIX NUMMUS*, Ehrenb. (= *H. hedenborgi*, Pfr.)

Very abundant in the Nahr el Kelb, near Beyrout.

23. *HELIX SOLITUDINIS*, Bourg.

Cœle Syria.

24. *HELIX PISANA*, Müll.

Plentiful along the coast, to which it is strictly confined. Specimens from the north are very richly coloured, while from the district near Gaza they are blanched and colourless in life.

25. *HELIX CÆSPITUM*, Drap.

On the coast and the hills near it, in the north of Palestine.

26. *HELIX VARIABILIS*, Drap.

Very common on Mount Carmel, and with many variations of colours and size. The eastern specimens seem generally to be smaller than those of Europe. Probably several of the species not recognized by us may be referred to varieties of this widely spread and most variable shell. M. de Saulcy does not appear to have met with it, but perhaps distinguished it under some other name.

27. *HELIX MARITIMA*, Drap.

Found on the hills along the coast. From the study of a long series of intermediate varieties, I should feel disposed to diminish very greatly the number of described species of this variable group.

28. *HELIX CAPERATA*, Mont. (= *H. langloisiana*, Bourg.?)

Common near Jerusalem.

29. *HELIX HIEROCHUNTINA*, Roth.

Takes the place of the preceding species in the Jordan valley. It may be at once distinguished by its red peristome and flattened spire.

30. *HELIX TURBINATA*, Jan.

Scarce on the coast.

31. *HELIX APICINA*, Lam.

In the north, on the dry rocks near the coast.

32. *HELIX CAMPESTRIS*, Ziegl.

Found on the high plateau of Moab and Easteru Gilead.

33. *HELIX PROTEA*, Ziegl.

Common and variable from the coast to the southern deserts. I have many specimens corresponding to *H. langloisiana* of Bourguinat, which appears to be only a strongly marked desert and blanched variety of the present species.

34. *HELIX VESTALIS*, Parr.

Abundant in a few localities.

35. *HELIX TUBERCULOSA*, Conrad.

Erroneously identified by Bourguinat with *H. despreauxii* from the Canaries. This is the most peculiar and interesting *Helix* in Palestine, and is found only sparingly in very restricted localities in the highlands west and south-west of the Dead Sea.

36. *HELIX LEDERERI*, Pfr.

In a few places on the coast, on sand-banks.

37. *HELIX SEETZENI*, Koch.

In immense numbers over the southern deserts, where it is the food of Sea-Gulls.

38. *HELIX ARABICA*, Roth.

Very scarce, and only south of the Dead Sea, taking the place of the preceding species.

39. *HELIX CANDIDISSIMA*, Drap.

Very common.

Var. *hierochuntina*, Boiss., granulated at the apex.

Var.  $\beta$ , extremely glossy, and less than one-third the size of African specimens.

40. *HELIX FIMBRIATA*, Bourg.

Found in a few restricted localities north and west of the Dead Sea.

41. *HELIX PROPHETARUM*, Bourg.

Scattered in several localities west and south of the Dead Sea, near Sebbeh and Jebel Usdum.

42. *HELIX BOISSIERI*, Charp.

This fine example of a desert species, with its thick cretaceous shell, its solid contracted mouth and black interior, is widely dispersed in different localities over the Judæan desert, but not so generally as *H. seetzeni*.

43. *HELIX FILIA*, Mouss.

This beautiful desert species has strong affinities both with *H. prophetarum* and *H. boissieri*. It is extremely scarce, and is found only in a few localities near the Dead Sea.

44. *HELIX CARIOSA*, Oliv.

Extremely abundant in the mountain districts of Western Palestine; not observed in the east. The three varieties, (1) *amphicyrta*, (2) *nazarensis*, (3) *crassocarina*, are easily recognizable. The third

is the prevailing type in the north, distinguished by its depressed spire and broad flattened keel. About Nazareth it gives way to the second variety, rounder, with the keel more compressed, but still the spire depressed. Specimens about Jerusalem and Carmel partake of the character of the first variety, with elevated spire; while at Hebron, the southern limit we observed for this shell, the northern form *crassocarina* reappears unchanged in the slightest particulars.

45. *HELIX CÆSAREANA*, Parr.

Abundant in the plain of Sharon and about the Sea of Galilee. The specimens from Gennesaret are much larger and more richly marked than those from Judæa.

46. *HELIX SPIRIPLANA*, Oliv. (*H. guttata*, Bourg.)

Generally distributed, but not numerous—in the higher grounds of Southern Palestine, and not found in the same localities as the preceding.

47. *HELIX MASADÆ*, n. sp.

*T. umbilicata, depressa, solida, albida, transversim regulariter et profunde striata, et superne et infra; zonis evanescentibus fuscis albo interruptis aliquando ornata; anfract. 5 superiores carinati, plani, sutura protracta, ultimus antice valde deflexus; apertura obliqua, rotundata; perist. reflexo, expanso, sæpe umbilicum celante.*

Diam. maj. 30, min. 25, alt. 14 mill.

Apert. diam. maj. 13, min. 11 mill.

*Hab.* Sebbeh (ant. Masada), and the most barren and sterile mountains from there to Jebel Usdum, the salt-mountain. The deep and regular striation of this shell distinguishes it at once from *H. spiriplana*, for a small variety of which (such as that which Conrad has described under the name *H. lithophaga*) it might otherwise be mistaken.

48. *HELIX ASPERSA*, Müll.

Very common in the gardens of Tyre, Sidon, Beyrout, Jaffa, and all places on the coast. We did not meet with it inland. It reaches a very large size—quite equal to the specimens from Algeria, and far surpassing those of the Greek islands. This as well as all the following species and *H. cæsareana* are collected and sold in the markets for food.

49. *HELIX CAVATA*, Mouss.

Common in the interior; not plentiful near the coast.

50. *HELIX PRASINATA*, Roth.

We did not find this species ourselves; but I possess three specimens given me at Jerusalem by my lamented friend, its discoverer, Dr. Roth.

51. *HELIX LIGATA*, Müll.

In the Lebanon.

52. *HELIX SOLIDA*, Ziegl.

Between Nablous and the Jordan.

53. *HELIX PACHYA*, Bourg.

Near the Lake of Gennesaret, and north of Beyrout.

54. *HELIX ENGADDENSIS*, Bourg.

In the wilderness of Judæa.

These six species appear to me to be very closely allied, the most important differences being in the aperture, which is almost circular in *H. cavata* (a species closely allied to *H. figulina*), and is oval and elongated in *H. prasinata* and *H. engaddensis*. The differences in size and colour are certainly very great; yet I am inclined to believe that they are attributable rather to climate and locality, and that further research will embrace all in two or at most three species. In the immense series we collected, it is difficult anywhere to draw a satisfactory line.

55. *HELIX VERMICULATA*, Müll.

A dwarf form of this widely spread and variable shell occurs between Beyrout and Tripoli. In Northern Syria it is as large as in North Africa.

56. *BULIMUS ACUTUS*, Drap.

Common on the sandy banks near the shore between Beyrout and Sidon; scarcer to the southward.

57. *BULIMUS DECOLLATUS*, Brug.

Found by us sparingly in the plain of Sharon. This is, so far as I am aware, the most eastern locality hitherto noticed for this shell. I cannot altogether agree with the remark of Bourguinat, that *B. decollatus* does not vary in the east and west, excepting in size, those from the east being considerably larger than from the west. I possess an extensive series collected by myself in every country bordering on the Mediterranean, from Spain and Morocco to Asia Minor, Cyprus, and Syria. The specimens from Algeria and Tunis are very much larger than any on the northern side, reaching the length of  $2\frac{1}{4}$  inches without the rejected portion of the apex. The Spanish specimens are much more obtuse, and with fewer whorls, than those from countries further east; and the further we proceed eastward, the longer and the more attenuated do we find the shell, till in Cyprus and Palestine it reaches its extreme attenuation, though not approaching African specimens in size. It does not appear to occur in Egypt.

58. *BULIMUS FASCIOLATUS*, Oliv. (var. *eburnea*).

Scarce, in the neighbourhood of the Wady Kelt, near Jericho.

59. *BULIMUS LABROSUS*, Oliv.

The finest and most characteristic shell of Palestine. It is found, generally concealed in small fissures of the limestone rocks, sometimes under stones, throughout the whole of Western Palestine, as far as the edge of the Ghor or Jordan valley, but not beyond. It is most abundant near the coast, where it attains its greatest size. A very small variety is found in the southern wilderness.

60. *BULIMUS CARNEUS*, Pfr.

This beautiful shell takes the place of the preceding species in the basin of the Dead Sea towards the south; but we never found it north of Engedi, nor on the east side. It is most plentiful about the famed rock of Masada, the modern Sebbeh. We brought a considerable number home alive, which are now depositing their eggs, and feeding on succulent plants. It is impossible, after observing a large series, to have any hesitation in separating *B. carneus* specifically from *B. labrosus*. The elongated form, the mouth proportionally less than half the size of the other species, and circular instead of being extended towards the right, the solidity of the peristome, and the callosity largely extended over the last whorl at once distinguish every specimen; nor have I ever detected any intermediate forms.

The typical *B. carneus* of Dr. Pfeiffer is from Lycia. I have not been able to compare my specimens with the type, though they appear to coincide exactly with the diagnosis and the figure. It is possible that our Dead Sea species may be distinct.

61. *BULIMUS HALEPENSIS*, Pfr.

Generally diffused, but scarce in number of individuals. Collected near Jerusalem and by the Dead Sea.

62. *BULIMUS SYRIACUS*, Pfr.

Extremely abundant in certain localities of the Lebanon.

63. *BULIMUS SIDONIENSIS*, Charp.

In the plain of Phœnicia and the neighbouring hills.

64. *BULIMUS ATTENUATUS*, Mouss.

Erroneously identified by Bourguinat with *B. obesatus*, Webb and Berthelot, from the Canaries. Frequent throughout the wooded hills and under brushwood in Western Palestine. The rich olive-green epidermis of the living shell seems to have escaped the notice of its describers.

65. *BULIMUS URIÆ*, n. sp.

*T. cylindracea, ventricosa, oblique arguteque striolata, nitidiuscula, corneo-olivacea vel cornea; anfract. 7, plano-convexis, ultimo anfractu dimidium longitudinis vix æquante; apertura obliqua, rotundata, contracta; peristomate albo, intus labiato, reflexo; margine columellari vix dilatato.*

Long. tota 15, lat. 7; apert. long.  $5\frac{1}{2}$ , lat.  $4\frac{1}{2}$  mill.

*Hab.* The Wady of Amman (Rabbath Ammon).



This *Bulimus*, the Transjordanic representative of *B. attenuatus*, is intermediate in character between it and *B. pupa* of Greece and Algeria. From the latter it may be distinguished at once by its olive-green colour and by its suddenly expanding fifth whorl, which gives it a peculiar obese appearance. From the former it is distinguished by the sixth and seventh whorls increasing instead of contracting.

66. *BULIMUS* (*CHONDRUS*) *TRICUSPIS*, Pfr.

Not uncommon near Beyrout.

67. *BULIMUS* (*CHONDRUS*) *SEPTEMDENTATUS*, Roth.

Common throughout the whole country, and subject to great variations in size. The mouth is frequently six-toothed, and sometimes only five-toothed.

68. *BULIMUS* (*CHONDRUS*) *OVULARIS*, Oliv.

Common. For the distinctions between this and the last species, see Mousson, Coq. p. 46.

69. *BULIMUS* (*CHONDRUS*) *SAULCYI*, Bourg.

About the plain of Gennesaret and the Dead Sea. Confined, apparently, to the Jordan valley. Like *B. ovularis*, but invariably sinistral, and found in distinct localities.

70. *BULIMUS* (*CHONDRUS*) *NUCIFRAGUS*, Parr.

Scarce; found at Jaffa and near Jerusalem.

71. *PUPA DELESSERTI*, Bourg.

Scarce, in the Anti-Lebanon.

72. *PUPA SAULCYI*, Bourg.

Two specimens found near Tyre, in the hills.

73. *PUPA RHODIA*, Roth.

Scarce near Jerusalem. Very abundant on a rock near the Lake of Gennesaret, but extremely local.

74. *PUPA GRANUM*, Drap.

Near Sidon, in the plain of Phœnicia.

75. *PUPA SCYPHUS*, Friv. (?).

A single dead specimen in the Lebanon.

76. *PUPA LIBANOTICA*, n. sp.

*T. cylindrico-oblonga, cornea vel albidula, sub lente irregulariter striata, apice obtusissimo; anfract. 10, convexiusculi, sutura impressa, anfractus quinque primi obtusissimi, et rapide crescentes, anfractus sextus septimum subæquans, ultimus et penultimus valde coarctati, ultimus basi carinatus, et prope aper-*

*turam coarctatus; apertura semiovali unidentata, dente in callo sito; peristomate albido, reflexo, in callum continuo.*

Long. tota 11, lat.  $4\frac{1}{2}$  mill.

Found at Ainat, in the Lebanon.

77. PUPA MICHONII, Bourg.

One dead specimen found near Nazareth.

78. PUPA HEBRAICA, n. sp. = *Hebraica*

*T. minutissima, oblonga, regulariter et pulcherrime sulcis striata, apice abbreviato et obtusissimo, nitida, cornea, pellucida; anfract. 6, tertio ultimum in turgiditate superante, sutura profunda, ultimo ad aperturam forte coarctato; apertura pæne rotunda, sed infra contracta, peristomate continuo, supra callo simplici vix reflexo, tridentata, uno in callo, duobus ad marginem sinistram sitis.*

Long.  $2\frac{3}{4}$ , lat.  $1\frac{1}{2}$  mill.

Found in a tomb near Jericho. The beautiful and regular transverse ridges on the whorls, as seen through a magnifying-glass, at once distinguish this from every other species of *Pupa*.

79. CLAUSILIA MÆSTA, Fér.

Near Jaffa, near Beyrout, and occasionally in the hills behind the plain of Phœnicia.

80. CLAUSILIA STRANGULATA, Fér.

Plentiful in the ravine of the Nahr-el-Kelb, Lebanon.

81. CLAUSILIA SAULCYI, Bourg.

Only found by us at the Ladder of Tyre. Collected by M. de Sauley near Jerusalem.

82. CLAUSILIA DELESSERTI, Bourg.

In the Nahr-el-Kelb, in damp caves; scarce.

83. CLAUSILIA ALBERSI, Bourg.

In the valley of the Kadisha, Lebanon.

84. CLAUSILIA BOISSIERI, Charp.

Excessively abundant near the Nahr-el-Kelb and on the rocks near Beyrout. Found abundantly on rocks, a few yards from the spray of the sea. It reaches a larger size here, and the peristome is more expanded, than in specimens from Crete and other parts of Greece.

85. CLAUSILIA GENEZERETHANA, n. sp.

*T. rimata, fusiformis, elongata, gracillima, confertim et acute lamellata, fusciscenti-albida; spira regulariter attenuata, apice cornea, acutiuscula; sutura profunda, lamellis prominentibus; anfractibus 15, minime convexis, ultimo infra suturam compresso, antice rugoso-costulato, breviter vix obsolete bicristato;*

*crista rimali obsoleta; apertura parva, pyriformi; lamellis exiguis approximatis; lamella inconspicua; plica palatali 1, subcolumellari, emersu; peristomate continuo, tenui, soluto, vix expanso.*

Long.  $20\frac{1}{2}$ , diam. 3 mill.

Found only on rocks near the plain of Geunesaret.

86. *CLAUSILIA MEDLYCOTTI*, n. sp.

*T. rimata, fusiformis, elongata, gracilis, acute et fortissime nec semper regulariter lamellata, fuscescenti-albida; spira regulariter attenuata; apice corneo, acutissimo; sutura profunda, lamellis interdum alternatis; anfract. 13-14, vix convexiusculis, ultimo latere impresso, basi bicristato; crista rimali, profunda, antice rugoso-costulata; apertura contracta, pyriformi; lamella inconspicua; plica palatali 1, subcolumellari, inconspicua; peristomate continuo, expanso, soluto.*

Long. mill. 19, diam.  $3\frac{1}{2}$ ; apert. long. 3, lat.  $2\frac{1}{2}$  mill.

This most beautiful *Clausilia*, which I have great pleasure in dedicating to my friend and fellow-traveller Mr. W. C. P. Medlycott, was found by us only in one place, but in considerable plenty, in the hills behind Surafend (Sarepta). It may at once be distinguished from all others by the boldness of its sculpture, and by its very deep and distinct, though sometimes irregular, ridges.

87. *TORNATELLINA* (Beck) *HIEROSOLYMARUM*, Roth.

Scarce, in tombs in various parts of the country.

88. *GLANDINA* (*CÆCILIANELLA*) *TUMULORUM*, var. *judaica*, Bourg.

In tombs at Jerusalem.

89. *PLANORBIS HEBRAICUS*, Bourg.

Ain Mellaheh, near Lake Huleh.

90. *PLANORBIS PISCINARUM*, Bourg.

Near Zebdany, in Cœle Syria.

91. *LIMNÆUS TENER*, Parr.

Near the Lake Huleh.

92. *LIMNÆUS SYRIACUS*?, Mouss.

Near Baalbec.

93. *CYCLOSTOMA OLIVIERI*, Pfr.

Very common in the neighbourhood of the plains of Phœucia and Acre, but not met with further south or east.

94. *BITHINIA HEBRÆORUM*, Bourg.

Ain Fijeh, and other fountains in the Bukáa; very common.

## 95. BITHINIA (PALUDINA) PHIALENSIS, Conrad.

Birket-er-Ram (Lake Phiala).

## 96. BITHINIA RUBENS, Menke.

Lake Huleh.

There are several other species of minute *Paludinidæ*, which I have not been able to determine.

## 97. MELANIA TUBERCULATA, Müll.

Occurs living in various streams, and semifossil in great numbers on the marl-deposits by the Dead Sea. By the shores of the Lake of Galilee dead and bleached specimens are very common.

## 98. MELANIA ROTHIANA, Mouss.

We obtained several dead specimens of this shell by the Sea of Galilee; but I am more than doubtful of its specific value, believing it to be merely an elongated form of *M. tuberculata*.

## 99. MELANIA PYRAMIS, Bursch.

In the Nahr-el-Kelb. Always a deep brown-black, and differing from *M. tuberculata* in the absence of the longitudinal ridges and tubercles on the spire.

## 100. MELANIA RUBRO-PUNCTATA, n. sp.

*T. elongata, fusiformis, tenuis, pellucidior, corneo-albida, puncturis rubris in lineis longitudinalibus dispositis ornata, costulis numerosis spiralibus exarata; anfract. 12, sed apice sæpe eroso; anfract. convexiusculis, summis solis costulis longitudinalibus (sicut in M. tuberculata) sculptis; apertura subelliptica, coarctata, effusa; columella alba.*

Long. 21, diam. 5 mill.; altera 17 long., 3½ diam.

*Hab.* Buried in the sand, in fountains near the Dead Sea.

Had I not consulted more experienced naturalists than myself, I should have felt disposed to have included this as a delicate and very beautiful variety of the variable *M. tuberculata*. The distinctive characters are the extreme smallness of the aperture and the sudden termination of the longitudinal sculpture, which does not extend to the lower whorls.

## 101. MELANOPSIS PRÆROSA (L.).

Very abundant in almost all the streams of Palestine, and found subfossil in the old marl-deposits by the shores of the Dead Sea. There is a distinct variety peculiar to almost every district.

Var. A, from the Nahr-el-Kelb, near Beyrout, is horn-colour, with three dark brown bands.

Var. B, from streams near Engedi and other streams flowing into the Dead Sea, is much larger than any other specimens I have seen, and may be at once recognized by a compression on the right side of the peristome, near the columella. It is rarely black, but of a rich

brown colour, and the inside of the mouth a pale purple. It may be hereafter separated as a distinct species.

Var. C, from the waters of Merom and the Lake of Galilee, is very large, almost approaching the specimens of Engedi in size, but black, more inflated and obtuse, and with a rich deep purple colour inside the mouth. Those from the Kishon are similar, but smaller.

102. MELANOPSIS AMMONIS, n. sp.

*T. oblonga, nitida, nigrescens vel fusco-cornea, apice acuto, raro eroso; anfract. 7-9, planis, regulariter crescentibus, non gradatis, laevibus; costis vel striis indistinctis et interdum obsoletis sculpta; apertura ovali; perist. simplici, acuto; callo albo, effuso; columella albida et inflexa.*

Long. 25, diam. 10; apert. long. 7, larg. 5 mill.

I was at first inclined to place this shell as a variety of *M. præ-rosa*; but its more elegant and elongated shape, the smallness of its mouth, and the traces of longitudinal ridges appear to me sufficient to justify its separation. Found only in streams at Heshbon and Ammon, east of Jordan, where the other species does not occur.

103. MELANOPSIS SAULCYI, Bourg.

In a few restricted localities; chiefly at Ain Sultan, Jericho.

104. MELANOPSIS COSTELLATA, Fér.

In the Kishon. The differences between this and the preceding are clearly pointed out by Bourguinat. This species is less fusiform, more inflated, does not increase regularly, and its last whorl is three times the size of the others united; while that of *M. saulcyi* is not more than once and a half as large.

105. MELANOPSIS COSTATA, Oliv.

Very abundant in the Huleh (waters of Merom), the Lake of Galilee, and the Upper Jordan. In immense quantities in a subfossil state round the Dead Sea.

106. MELANOPSIS JORDANICA, Roth.

Peculiar, so far as we could ascertain, to the Lake of Galilee and the Jordan below it.

Rossmässler, as well as Roth at an earlier period, considered this to be a variety of the preceding species. There is, however, a striking difference, not only in the shape and coloration, but in the habit of the living animal. *M. costata* is always found adhering to the stems and the under surface of the leaves of aquatic plants; while the obtuse and striped form, *M. jordanica*, adheres only to rocks and stones. *M. costata* we never met with south of the entrance to the Lake of Galilee in a living state, nor *M. jordanica* to the north of it.

107. MELANOPSIS EREMITA, n. sp.

*T. fusiformis, semipellucida, elongato-pyramidalis, nitida, resplendens, vitreo-cornea, longitudinaliter irregulariter sed delica-*

*tissime striolata; apice acuto, nunquam eroso; anfractibus 6-8, planis, regulariter crescentibus; sutura parum impressa; apertura ovalis; peristomate, simplici, acuto; callo albescente; columella albida et inflexa.*

Long. 16, diam.  $6\frac{1}{2}$  mill.; apert. long. 5, lat.  $3\frac{1}{2}$  mill.

Collected only in the little stream of the Wady Um Bagkek, between Sebbeh and Jebel Usdum, at the south-west corner of the Dead Sea, where it was very abundant.

This beautiful and very small species of *Melanopsis* may be at once recognized by its peculiarly brilliant gloss. It may be remarked, that in the same region which supplies the smallest of its group, the common *Melanopsis prærosa* attains its greatest magnitude.

108. *NERITINA JORDANI*, Buttl.

Found only in the Jordan and its two lakes, Huleh and Galilee; but chiefly under the leaves of water-lilies in the Huleh. We never discovered it living in the lower course of the Jordan.

109. *NERITINA MICHONII*, Bourg.

Abundant in almost every stream and spring throughout the whole of Palestine, east and west, except in the Jordan and its lakes. It attains its greatest size in the thermal springs of the Ghor.

110. *NERITINA BELLARDI*, Mouss.

I have not had the opportunity of examining a type specimen; but, from the diagnosis, I believe this species to be that which is found in the Jabbok and its affluents. It is certainly different from *N. michonii*, as may be at once recognized by an examination of its operculum.

111. *CYRENA COR*, Lam.

Abundant in the Jordan and the Lakes of Huleh and Tiberias. In the latter it attains a very large size.

112. *CYRENA FLUVIATILIS*, Müll.

This species, if it be really distinct, is not uncommon in the Jordan. What is the *Cyrena crassula* of Mousson, found near Jaffa?

113. *UNIO TERMINALIS*, Bourg.

This is the common *Unio* of the Lake of Galilee, and I found it also in the Litany (Leontes) River. The *Unio jordanicus*, Bourg., seems to be only a thinner and shorter variety of *U. terminalis*. I have obtained so many intermediate specimens that it appears to me impossible to separate the two. *U. terminalis* also seems to be identical with the *U. dignatus*, Lea, from the Tigris, as I find on comparison of type specimens in Mr. Cuming's collection.

114. *UNIO DELESSERTI*, Bourg.

In the Zerka or Crocodile River, in the plain of Sharon. Found by M. de Sauley near Jaffa, in the same plain.

115. *UNIO MICHONII*, Bourg.

In the Zerka or Crocodile River. Figured by Bourguinat from the neighbouring streams of Jaffa. Appears to be but a variety of the *U. marginalis*, Lamarck, a variable species found in India, Mauritius, and China.

116. *UNIO SAULCYI*, Bourg.

From the Kishon. Found by M. de Sauley in the streams near Jaffa. This species is very like *U. mosalensis*, Lea, from the Tigris, if indeed it be not the same species.

117. *UNIO SIMONIS*, n. sp.

*T. ovato-rotundata, supra arcuata, infra subrecte arcuata, antice posticeque rotundata, ventricosa, crassissima, concentricè striata, epidermide nigra vel nigrescente, vel in juvenibus fusco-virescente; umbonibus valde prominentibus, recurvis, extremitate anteriore approximatis, striis undulantibus sculptis; dente cardinali crasso, altissimo, denticulato, sulcis rigidis impresso; dente laterali crasso, producto; sinu palliali profunde impresso; t. infra nacreo-roseo pulcherrime resplendente.*

Long. 66, lat. 44, diam. 32 mill.

This shell is found in the Jordan, the Sea of Galilee (where it reaches its greatest dimensions), the Orontes, and the Leontes (Litany). Its rotundity, thickness, solidity, and the brilliant rosy tint of its nacreous interior distinguish it at once from every other species. The massive solidity of the young shells is very remarkable. The rosy tint is equally brilliant in all the specimens I have seen.

118. *UNIO EPISCOPALIS*, n. sp.

*T. elongato-ovalis, valde inæquilateralis, subcomplanata, crassa, supra recta, infra compressa, postice rotundata, antice elongata, concentricè striata; epidermide nigerrima; umbonibus prominulis; dente cardinali alto, crasso, subacuto, fortissimo, laterali forti, elongato, nacreo, purpureo-episcopali pulcherrimo; sinu palliali profundissime impresso.*

Long. 98, lat. 56, diam. 35 mill.

This, the prince of Oriental *Unionidæ*, is not uncommon in the Orontes. I found a dead valve by the Leontes, but did not meet with it in the Lake of Galilee. From its brilliant purple hue, which is preserved in the most worn valves, from its size, its jet-black epidermis, and the peculiar compression, it is a remarkable and isolated species. I can find no *Unio* in the collection of Mr. Cuming which at all resembles it.

119. *UNIO TRIPOLITANUS*, Bourg.

Near Tripoli.

The following is a list of species mentioned by previous writers, but not found or identified by us; many of them are doubtful:—

- Limax variegatus*, Ehrenb.  
*Daudebardia syriaca*, Roth.  
*Helix pratensis*, Fér.  
 — *obstructa*, Fér.  
 — *arenosa*, Ziegl.  
 — *simulata*, Fér.  
 — *genezerethana*, Mouss.  
 — *improbata*, Mouss.  
 — *crispulata*, Mouss.  
 — *joppensis*, Roth.  
 — *neglecta*, Drap.  
*Bulinus benjamiticus*, Benson.  
 — (*Chondrus*) *lamelliferus*, Rossm.  
*Pupa chondriformis*, Mouss.  
*Clausilia ehrenbergii*, Roth.  
*Glandina liesvillei*, Bourg.  
*Limnæus truncatulus*, Gm.  
*Cyclostoma elegans*, Drap.  
*Bithinia saulcyi*, Bourg.  
 — *gaillardoti*, Bourg.  
 — *hawadieriana*, Bourg.  
 — *moquiniana*, Bourg.  
*Melania judaica*, Roth.  
*Neritina syriaca*, Bourg.  
*Cyrena crassula*, Mouss.  
*Unio requieni*, Mich.  
 — *litoralis*, Lam.

I may state that I have seen type specimens of *Helix joppensis*, *Bulinus benjamiticus*, and *Melania judaica*, the two former of which are unquestionably good species. *Helix genezerethana* is perhaps only a large variety of *H. nummus*, Ehrenb.

8. CONTRIBUTIONS TOWARDS A MORE COMPLETE KNOWLEDGE OF THE AXIAL SKELETON IN THE PRIMATES. BY ST. GEORGE MIVART, F.Z.S. & L.S., LECTURER ON COMPARATIVE ANATOMY AT ST. MARY'S HOSPITAL.

The great interest which has been felt of late as to the value and extent of the anatomical resemblances and differences between Man and the rest of the Primates has led to many researches, which have, however, been mainly directed to a consideration of the head and extremities, and especially of the bony framework of those parts.

To the various details given by Cuvier and others, respecting the cranial structure of the highest Apes as compared with each other and with Man, such careful and minute comparisons have from time to time been added by Professor Owen, in his well-known and justly esteemed memoirs on the subject, published in the 'Transactions' of this Society, and last of all by Professor Huxley, in his elaborate